FUNCTIONS: CHANGING PARAMETERS 07 APRIL 2014

Lesson Description

In this lesson we:

- Look at the effects that p and q have on :
  - $y = (x-p)^2 + q$
  - $(x-p)(y-q) = k$

Summary

If $g(x) = (x-p)^2 + q$

What effect does q have on the graph of *g* if $q > 0$? If q<0?

What effect does p have on the graph of *g* if p > 0? If p < 0?

If $f(x) = \frac{k}{x-p} + q$

What effect does q have on the graph of *g* if $q > 0$? If q<0?

What effect does p have on the graph of *g* if p > 0? If p < 0?

Test Yourself

Question 1

Explain how you can obtain the following graphs from $y = -4x^2$:

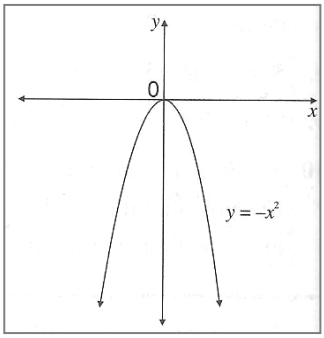
a) $y = -4(x+1)^2$

b) $y = -4x^2 + 2$

c) $y = -4(x-3)^2 - 1$

Question 2

The graph of $y = -x^2$ is shown alongside.



If you move the graph of $y = -x^2$ one unit upward and four units to the left you obtain a new graph.

a) What is the equation of the new graph?

b) What are the coordinates of the new turning point?

c) What are the x- and y-intercepts?

Question 3

Draw sketch graphs of the following parabolas. Label the turning point, axis of symmetry and intercepts on both axes (where they exist).

a) $y = x^2 + 6x$

b) $y = 2x^2 + 8x + 10$

c) $y = -x^2 + 2x - 3$

d) $y = -2(x-1)^2 + 4$

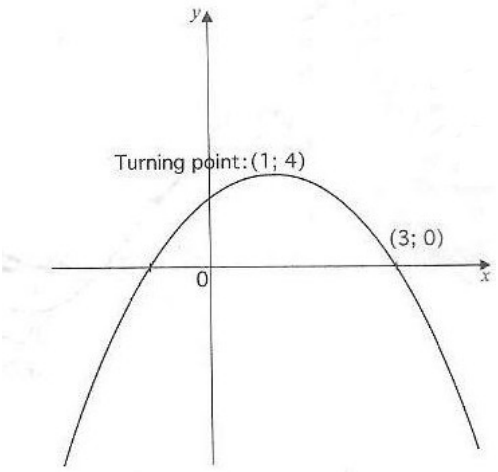
Question 4

Draw rough sketches of the following parabolas in the form $y = a(x-p)^2 + q$ where a, p and q have the following properties:

	a	p	q
a)	$a > 0$	$p > 0$	$q > 0$
b)	$0 < a < 1$	$p = 0$	$q < 0$
c)	$a < 0$	$p < 0$	$q = 0$
d)	$a > 1$	$p > 0$	$q < 0$
e)	$a < 0$	$p < 0$	$q < 0$

Question 5

Find the equation of the following graph



Question 6

Sketch the following graph

$$f(x) = \frac{6}{x-1} + 3$$

Improve your Skills

Question 1

Sketch the graphs on the same system of axes and discuss the effect of p:

$y = x^2; y = (x-2)^2 and\ y = (x+2)^2$

Question 2

Sketch the graphs of on the same system of axes and discuss the effect of q:

$y = x^2 + 1;\quad y = (x-2)^2 + 1$

$y = (x+2)^2 + 1$

Question 3

Sketch the graph of $g(x) = -2x^2 - 5x + 3$ by writing it in the form $y = a(x-p)^2 + q$ first.

Question 4

Sketch the graphs on the same system of axes and discuss the effect of p and q:

$y = \frac{6}{x}; y = \frac{6}{x-2} + 1$